Published by Authority of the New South Wales Commissioners
for the World's Columbian Exposition, Chicago, 1893.

THE MARINE FISH AND FISHERIES

OF

NEW SOUTH WALES,

PAST AND PRESENT,

IN THEIR COMMERCIAL ASPECT.

BY

PHILIP COHEN.

Sydney:
CHARLES POTTER, GOVERNMENT PRINTER.

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COMMISSIONERS' PREFACE.

(Specially addressed to the Fishermen of the United Kingdom, Canada, and the United States of America.)

THIS pamphlet has been written not only for the purpose of giving reliable information in connection with the extensive Marine Fish and Fisheries of New South Wales, but also with a view of promoting, as far as possible, the introduction to our shores of persons skilled in the prosecution of the Fisheries of the United Kingdom and America into this Colony, where, as is hereafter shown in the letterpress of this pamphlet, ample scope and remunerative occupation can readily be found for them in the special lines of training and avocation to which they have been accustomed, a class of labour in which the Colonies up to the present time have been very deficient.

On this point the particular attention of the reader is directed to the allusions to be found upon the following pages of this pamphlet :—6, 7, 26, 27, 28, 29, 30.

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THE MARINE FISH AND FISHERIES OF NEW SOUTH WALES.

The object of this pamphlet is not to provide a complete technical description of the whole of the very numerous species of fish contained in the waters of New South Wales, but simply to select and describe the fish we possess in abundance, and which have a distinctly commercial value. It may safely be said, that, except perhaps to a few scientists, the great majority of our best species of edible fishes are unheard of and unknown to the outer world. The large importations of fish which are continually pouring into this Colony from Europe and America might lead people at a distance to infer that the surrounding seas are singularly devoid of that commodity. Such is by no means the case. Providence has acted very bountifully in this respect, not only as regards New South Wales, but all Australia. Nevertheless, our fish supply is sparse in the extreme; the local market is ill regulated with regard to it, and the demand by far exceeds the quantities brought to market. Hence, we are, at times, afflicted with scarcity, and corresponding high prices, and the market is in a continual state of depletion.

Such a deplorable state of things piscatorial as here described, is to be attributed to the utter absence of experienced sea-going fishermen, and the want of modern effective means of transit to market. It is indeed an anomaly that while the adjacent waters are teeming with various fine species of of fish we should continue to be dependent on foreign supply, and, doubtless, what should be a great and thriving industry will continue to be dwarfed, and practically undeveloped, until our local fishermen become more enlightened, or are displaced by the advent of men who understand their profession in all its details, and who would not be afraid to face the perils of the deep, which are, comparatively speaking, minimised in the placid waters of the Pacific Ocean.

In the early days of the Colony many writers, and some historians, were profuse in their astonishment and admiration when giving descriptive accounts of the numberless varieties and immense quantities of fish having their habitat in Sydney Harbour, its inlets, and tributaries. In those times, and long afterwards, whenever and wherever the fishermen cast their nets great hauls were made; consequently fish food was always abundant, and continued to be so for many long years subsequently without materially diminishing what was then naturally considered a never-failing supply. For more than fifty years after the foundation of the Colony nearly the whole of the supply was drawn from Port Jackson and its waters. The early colonists had no occasion to go further afield; they were enabled to catch any quantity of fine fish almost at the very thresholds of their dwellings, and, unfortunately, their successors have continued in the same groove up to the present day. The so-called fishermen of the earlier days had no necessity to

go outside Sydney Heads to gather the spoil, the then prolific and extensive waters of the harbour and the local rivers yielded to them all and more than the fish required for the supply of a limited consumption, consequently in the earlier times the labour of the fisherman was minimised, and although the price was moderate, yet his gains were proportionately large. Things continued in this wise until population increased by leaps and bounds, and generation increased upon generation, necessitating a continued augmentation of the fish supply, but the fishermen did not, nor do they now, keep pace with the times. Many industries have vastly and wonderfully improved upon their lines, but, strange to say, our fishing industry has remained stationary. The old appliances of a century ago continue up to the present hour. The same enclosed waters which they and their predecessors have worked unceasingly for scores of years past continue to receive their sole and unremitting attention, hence the deplorable scarcity and high prices of fresh fish obtaining in New South Wales. The inevitable seine and the meshing-net, and the small ricketty open boat constitute the Australian fisherman's entire plant, no provision whatever is made for deep-sea fishing, which necessary and profitable branch of the industry still continues in abeyance. It is scarcely credible, yet nevertheless it is a melancholy fact, that we do not possess a single sea-going fishing craft, nor any description of fishing gear, except that described. Not a fishing-smack or lugger is to be found sailing out of any port in New South Wales, or indeed out of any port in all Australia. Notwithstanding that a great abundance of various species of fish are known to exist in the deep waters off the coast, they have never been utilised, the efforts of our local fishermen being confined to the constant use of the seine in the shallow waters of the harbours, rivers, and lagoons, deep-sea fishing is absolutely ignored, and in a measure almost unknown.

The coast of New South Wales extends about 650 miles from Cape Howe to the southern boundary of Queensland, numerous great rivers, bays, indents, and estuaries, with the addition of extensive lakes or lagoons marking its entire length. These at all seasons of the year are the resorts of vast numbers of various descriptions of splendid fish, which are only sparsely utilised, if the distance of the localities exceed but a few miles from the metropolitan market, simply for the reason that we are not possessed of means to effect a speedy and safe transit of the fish so as to arrive in good condition at its destination, consequently it is no unusual thing for immense quantities of fine fish to become decomposed, and rendered valueless, both in course of transit, and at the various localities along the coast where they are caught. Under such deplorable conditions it may be easily understood why fish continue to be scarce and high-priced in the Sydney market.

It is a matter of surprise, and much to be regretted, that some of the many experienced fishermen of the United Kingdom and America, where it is an admitted fact that most of the fisheries are overmanned, have not long ere this been induced to transfer themselves and their belongings to what should be our vast and productive deep sea grounds, which doubtless exist in many directions off the coast.

The fisheries of the older countries having been worked continuously for hundreds of years, must, as a matter of course, be getting nearer their decadence as each successive year passes by, but here in these Australian seas the vast, and as yet undeveloped fisheries are, comparatively speaking, in a virgin state, and their productiveness, under normal conditions, for

hundreds of years to come is assured, and without doubt they would, from the abundance of their yield, prove highly remunerative to skilled and enterprising workers.

The consumption of fresh fish in all Australia, and more particularly in New South Wales is necessarily restricted, not because of its paucity in our waters, or any disregard of the generality of the inhabitants for a fish diet, but simply from the ruling of exorbitant prices, and the supply being immeasurably less than the demand. The imports of preserved fish to New South Wales alone now exceed in value £130,000 per annum. This large sum of money is expended yearly by the people of this country to procure that which we possess in superabundance in our own adjacent seas, and which, for the reason given, cannot be utilised. The anomaly is as strange as it is regrettable, but there it is continually staring us in the face. A vast and highly productive field for the skill and enterprise of numbers of practical men is here opened out on and off the coast of this Colony, where fisheries of vast extent continue to remain untouched by human hands, and whose almost virgin waters continue in the same condition as when nature formed them long ages ago.

In all great fish-producing countries the supply is principally drawn from the open seas. It is much to be regretted that the same rule does not apply to this Colony, where the prolific waters of the surrounding ocean are in a great measure ignored in favour of the harbours and rivers and other shallow waters abutting on the coast. The seine is the principal implement employed for the capture of fish, and as the fishermen continue hauling and scraping the same grounds year after year by day and night, without any intermission, the natural result follows that the fish market is only scantily supplied, and fish continues to be an expensive luxury instead of being abundant and moderately cheap. Unlike the fishermen of other and older countries, they of this country will not exert themselves in seeking for the whereabouts of the fish. They content themselves with waiting near their homes for it to come to them, and notwithstanding that the waters contiguous to the coast-line absolutely teem with various species of splendid fish, only very circumscribed and intermittent efforts are made for their capture in quantity.

As previously stated, the coast of New South Wales extends north and south for a distance nearly approaching 650 miles. From one end to the other it is studded with harbours, rivers, estuaries, bays, and other indents, but the most extraordinary feature of the coast is the presence of great intermediate lakes or lagoons, extending at intervals through its entire length, and situated at short distances from the foreshores, all these latter localities—with the exception of a few comparatively small lagoons contiguous to Sydney harbour, which, from incessant working, are for the time being nearly "fished out"—abound with many varieties of our best fish, such as whiting, mullet, garfish, bream, flathead, perch, &c., &c. Many of these enclosed waters away north of Sydney, which positively swarm with fish, have never yet had a net drawn through them, and there they continue up to the present hour unheeded and unsought for by the fishermen, who are destitute of means or method for transit to market from any moderate distance along the coast.

The coastal lakes or lagoons referred to are only at intervals subject to the influence of the ocean. Beyond a question of doubt they constitute to a very great extent the favourite spawning grounds of all the species of fish

above mentioned. It is only after floods, or at periods of abnormally high spring tides that their entrances become open to the influence of the sea. During such periods the ingress and egress of fish to and from the ocean is something as wonderful to behold as their numbers, both of matured and immatured, are prodigious.

The deep bays and other indents which predominate the coast-line and terminate in the shallow beaches of the foreshores, are at all seasons of the year well stocked with fish, in the summer months more especially when most species of ground fish are migrating or "schooling," but fine weather, with the wind off shore, is indispensable to the working of the open fisheries on the costal shallows, where, in many localities, such fine fish as whiting, bream, tarwhine, and sand-mullet are fairly abundant

With the exception of the schnapper and a few other species of deep sea fish, the great bulk of Australian fish are migratory. In their respective seasons vast schools of mullet, mackerel, herring, garfish, trevally, salmon, (Australian) *et hoc genus omne*, annually make their appearance off the coast, travelling in every instance from south to north, whence and whither is a mystery yet unsolved, nevertheless they come and go, meeting with little or no interception or molestation from the so-called fishermen of New South Wales, who, it is to be regretted, are possessed of neither the inclination nor the means for the successful working of our wonderfully prolific ocean fisheries, but content themselves with eking out a bare subsistence by continually and persistently scraping the harbours, rivers, and lagoons, and those only which are contiguous to their haunts and homes. Hence the paucity of our fish supply, and the constant poverty of the local fish-market. Doubtless such a deplorable state of things will continue until we welcome the advent of experienced sea-going fishermen, endowed with effective and more modern fishing appliances. Then, and not till then, will our abundant and non-developed fisheries assert their superiority, and the scandal of a fish famine existing in a land surrounded by abundance be removed from our midst.

SYNOPSIS OF THE PRINCIPAL FOOD FISHES OF NEW SOUTH WALES.

Schnapper *(Pagrus unicolor)*.

This splendid fish deservedly takes front rank in the category of Australian fish, not only by reason of its great abundance, but also for its super-excellence of quality. It exists in vast numbers throughout the whole length of the eastern coast. Its chief habitat is contiguous to submarine reefs and foul bottoms. The schnapper may be classed as omnivorous, its ordinary food consisting of the molusca living on the deep sea reefs and some few species of diminutive sea-weed. It is at all times a very ravenous fish, as its name denotes, and takes various descriptions of bait with great avidity. It congregates or schools in immense numbers, and is easily caught with hook and line at all seasons of the year. So greedily does it seize the bait that the merest tyro in fishing finds no difficulty in striking it. The schnapper, strictly speaking, is not migratory. According to the season of the year the great bulk of the larger or adult fish either

move in towards the coast or further out seaward as the case may be. For instance, in the later spring or early summer months they approach nearer to the coast for the purpose of depositing their spawn, while in the winter months they are to be found, to use the fishermen's term, "wide off" in the same locality, averaging from five to fifteen miles seaward from the coast. The fish commence to congregate or school in large numbers about the commencement of November, when they approach nearer to the coast than at any other period of the year. They spawn in December, and then move back to the outer grounds, where they become even more voracious than is habitual with them. At this particular season they could be taken in immense numbers if systematically sought for by men possessed of suitable vessels efficiently equipped with the necessary gear and bait.

The school or adult fish is supposed to have reached the age of three years, when its weight is from 6 to 9 lb. But that is by no means the extreme weight of the older fish, which vary from 10 to 25 lb., while in occasional instances they have been caught exceeding 30 lb. The previous stages of their existence are defined under the names of red-bream and squire. The former retain that denomination until they reach the age of about 18 months, and a weight from 1 to 2 lb., after which they enter into the "squire" stage, and retain that cognomen until they reach the third year of their existence, and exceed 6 lb. in weight, when they become what the fishermen term "count fish," and from that out have reached the adult stage.

In the olden time these fine fish abounded near the approaches of Sydney Harbour and even in the harbour itself, from the surroundings of which for a great many years, Sydney received the whole of its schnapper supply. In those days the fishermen had no occasion to go any distance outside the Heads in search of the fish, they had more than sufficient for all their purposes close at hand. But the continued and ceaseless working of the home fisheries combined with an immense and increasing traffic in and out of the port for years past, in addition to the merciless and unrestricted destruction of spawn and young fish in Port Jackson and its tributaries, have caused the almost utter annihilation of the old schnapper grounds both inside and immediately outside the harbour, so that the grand old fisheries of Sydney Harbour and its surroundings have now become things of the past. Nevertheless the fish continue to abound at all seasons of the year for hundreds of miles north and south of the Heads, but as previously stated the fishermen of this Colony cannot successfully work the deep-sea fisheries for want of both inclination and means.

The schnapper taken in all its aspects is a most valuable fish. Its flesh is purely white and firm, its flavour, with perhaps one or two minor exceptions, is not to be surpassed by any other species of fish in Australian waters. When properly cured and dried it is infinitely superior to cod or ling. Considering its amazing fecundity and the vastness of its numbers it could, without much difficulty, be rendered a valuable article of commerce. Some years ago, to the writer's knowledge, a few shipments in its dried state were made to China, where it readily realised from 160 to 175 dollars per ton.

Naneygay *(Beryx affinis)*.

This is a deliciously-flavoured fish, but hitherto it has for a short space of the year, visited the coast only in moderate numbers, which make their annual appearance in the months of October and November, and sometimes continue till the end of the year, when they freely intermix with the schnapper, and are often caught with the latter on the same grounds. They snap at the bait

greedily, and are easily taken with line and hook. They average from 1 lb. to 3 lb. in weight and in measurement seldom exceed 15 inches. The naneygay is esteemed a great delicacy and is much sought for during its limited visits to our coastal waters. In colour it is a bright pink, silvering towards the underparts, and it is possessed of abnormally large eyes for such a moderate sized fish. That it exists in quantities on banks not yet discovered off the coast there can be but very little doubt, as it is essentially a sea fish, but the locale of its permanent habitat remains to be revealed.

Black Rock Cod *(Serranus damellii).*

The black rock cod is certainly a splendid fish and is esteemed by many as being superior in flavour to the schnapper and indeed to any other species of fish swimming in Australian waters. In the earlier days of the Colony it abounded on the rocky bottoms both inside and outside Sydney Heads, but from causes previously explained, it is seldom or ever caught at the present day near those localities Still it continues moderately plentiful all along the northern coast where it often reaches immense proportions. The general weight of the fish is from 6 to 25 lb., but to the north extending from Seal Rocks, they have been captured at various times weighing from 50 to 300 lb, and in some few instances exceeding even that. Great size does not in any way deteriorate its flesh either in fibre or flavour; it is always snow white, flaky, and firm. Its habitat is usually in deep water, near submarine reefs and rocks. It is in no sense migratory, and is very sluggish in its movements. Their spawning season is about midsummer, but where they deposit their ova is quite a matter of conjecture, nothing positive being known. They are not gregarious, so far as is known, but are distributed in moderate numbers throughout the coastal waters where rough bottoms prevail. Like the naneygay their winter quarters have yet to be discovered. These fine fish in all probability may yet be found in a fair abundance on rocky bottoms extending to a moderate distance off the coast. The black rock cod is a true representative of the *percidæ* family. In colour it is dark brown or approaching to black, with mottled underparts, its head being large and somewhat elongated with a great extension of mouth. It is carnivorous and takes fish bait readily. When once hooked it exhibits very little spirit and suffers itself to be hauled up to the surface of the sea making but a poor show of resistance.

Wirrah *(Plectropama maculatum).*

This is another member of the *pereidæ* family, but it is infinitely inferior in every respect to its congener, the black rock cod. It is possessed of a very thick skin, while its flesh is abnormally hard, but not of a bad flavour if properly cooked. It is of a brownish-yellow colour, dotted over with small round black spots. It is not generally appreciated as a food fish, but the Chinese have a great predilection for it, and will purchase it readily. At some points of the coast it is fairly plentiful, and, like its congener, it is a deep-water fish, affecting foul and rocky bottoms, but in every other respect it is dissimilar. It seldom exceeds 4 lb. in weight, and 15 inches in length, is carnivorous, and is not particular in its acceptance of bait.

Red Rock Cod *(Scorpæna cardinalis).*

This fish prevails from one end of the coast to the other, and sometimes visits the schnapper grounds in great numbers. It is very voracious, and

swallows any description of bait with great avidity. In colour it is a dusky red, intersected with small brown spots and lines. It is never known to exceed 3 lb. in weight, its average being from ½ lb. to 2 lb., and its length from 8 to 12 inches. Its head is a very formidable-looking formation, being abnormally large, and covered with spines and other sharp protrusions, of which fishermen must always beware. The flesh of the fish is purely white and is by many esteemed a rare delicacy.

Morwhong *(Chilodactylus macropterus).*

The morwhong is a deep-sea fish, and very much resembles in form, habits and general characteristics the Tasmanian bastard trumpeter, of which it is a congener. It is only caught at intervals on the schnapper grounds, with which fish it freely intermingles. Taking bait readily, it is easily caught with the line, but never with the seine. It is an exceedingly fine-flavoured fish, and is much appreciated by those who are aware of its good qualities. It is not, so far as we know, gregarious, and is only captured in small numbers, but should it ever be discovered in quantities, which is highly probable, on some of the many "wide-off" grounds along the coast, the morwhong will become one of the best appreciated and most valuable of Australian fish.

Sergeant Baker, or Red Gurnet *(Aulopus purpurissatus).*

This is the only fish of the gurnet or gurnard family that needs mentioning in the descriptive part of this essay. We have three or four different species in our waters, but, with the exception of the one under notice, they are seen or caught singly only at long intervals. The Sergeant Baker (so named after the person who captured the first of its kind in Sydney Harbour), like the red rock cod, is ubiquitous. It is to be found in greater or smaller numbers all along the coast of New South Wales. Being a rock fish, it frequents submarine reefs and foul bottoms. It is carnivorous and takes fish-bait freely. It is most numerous in the summer season, and is occasionally taken by the line in goodly numbers. In some seasons it is much scarcer than in others, which fact leads one to infer that the fish are migratory. It is of a mottled-red colour, interspersed with grey. When full grown it weighs about 3 lb., and is about 18 inches long. Its flesh is purely white, of excellent flavour, and very flaky.

Australian Salmon *(Arripis salar).*

This fish is in no wise deserving of the name it bears. It is possessed of a handsome symmetrical form, but neither its flesh nor its flavour bears the remotest resemblance to the *salmo salar*, whose name it usurps. Nevertheless, it has some substantial qualities. It is of good size, and exists in very great abundance, and, if somewhat coarse, its flesh is plump and grainy, while the great roes it carries in season are of excellent flavour. The salmon migrate along the coast in November and December each year in enormous schools; and, doubtless, if they were properly and systematically utilised, would yield ample profit to all concerned in their capture. These fish, in comparatively small numbeers, are with us all the year round, but in the early summer months their name is legion. Travelling from south to north, prodigious bodies of them move along the coast. School succeeds school, each one covering acres of sea. It is no exaggeration to say that thousands of tons of them pass along the coast annually. In many

instances enormous numbers enter the harbours and rivers, into which they are mostly driven by their many enemies, which persistently follow the schools during their migration; and it is no uncommon thing in the northern rivers to find thousands of them driven ashore on to the sand-banks by the sharks and porpoises which generally accompany them on their travels, and there they are left to rot in the rays of the sun. The local fishermen, having no care for them, decline to take the trouble of gathering them in. These fish are not appreciated as they should be. If properly treated, after the manner of cod or ling, they would form just as palatable an article of food; and, from their large size and the prodigious numbers in which they congregate, they are capable of affording a very large quantity of nutritious and valuable food, either for home consumption or exportation, or both. Considering our large imports of dried cod, ling, and other fish, it is more than surprising that such immense bodies of edible fish should be suffered to pass by our very doors, as it were, unheeded and untouched. This indifference is as truly marvellous as such wanton and wilful waste is deplorable.

The full-grown fish measures over two feet, and its weight averages from 7 to 8 lb. At the schooling period its roes are full and very large, and the flavour of the latter is excellent, either fresh or smoked, and would be in great request, but unfortunately they are seldom obtainable. Such conditions form an anomaly which, to people residing in other lands, would appear to be inexplicable.

Teraglin *(Otelithus otelodus).*

This is a deep-sea fish and is gregarious. It is sometimes mistaken for young jew-fish, which it much resembles in contour of body, with the exception of the head, which is slightly more elongated, its scales being very much smaller and its flavour far superior. It is a migratory fish, and is rarely caught in enclosed waters. In the late spring and summer months it is often very abundant. The spawning season is in January, at which period it is in excellent condition, and very voracious, taking fish-bait greedily. In favorable seasons they can be taken in quantities with the line, but are seldom captured with nets. The full-grown fish measures about two feet, and its average weight is from 5 to 6 lb. From its likeness to jew-fish it is not appreciated as it deserves to be. Its flavour is exceedingly good, and its flesh perfectly white. In colour it is a silvery grey, turning darker after death. When first taken from the water it is exceedingly handsome, and should certainly be classed among the best of our food fishes.

Jew-fish *(Sciæna Antarctica).*

The jew-fish is one of the largest and most ravenous species of fish existing in our waters. It affects the harbour and rivers as well as the open sea, and numbers are to be found in all directions throughout the entire coast and coastal rivers, the more northern especially, where they attain great size, in many instances reaching over five feet in length, and weighing more than 80 lb. In general contour of body it resembles the English or American salmon, but its scales are very large, and its flesh has no affinity to those splendid fish, being very coarse in the larger species; but when the fish averages up to 30 lb. it is by no means ill-flavoured, and when properly cooked, it would puzzle many to distinguish it from some of the more favoured species of fish. The jew-fish is in every respect carnivorous, and is a real terror to the young and small of every other description of fish. The larger fish are often solitary in their habits, and

commit their depredations singly ; while those of 30 lb. and under are wolfish in their instincts, hunting, as it were, in packs or schools, devouring and destroying young fish in hecatombs. They seize fish or squid bait voraciously, fighting desperately for life when first hooked, but when once turned they unmistakably exhibit the white feather. They are also often captured by the seine, the shallows offering great inducements for their predatory propensities. As before stated, the large, over-grown fish are coarse in fibre, and not much utilised ; but the smaller fish are not by any means to be despised. Their flesh is white, fairly flavoured, and succulent, while the roes of both large and small are really magnificent, being of immense size. The eggs are infinitesimally small in comparison with the size of the fish. Jew-fish of moderate size sell readily in the Sydney market, and often the larger ones find eager purchasers. In many Sydney restaurants, where the absence of real schnapper, for many reasons, is proverbial, cutlets from this fish, served up *à la* schnapper, cannot in a very great number of instances be distinguished from those taken from the real "Simon Pure." That these fish could be profitably utilised there can be no manner of doubt. Their roes, for size and delicacy of flavour, are not to be excelled by those of any other fish. The sounds or air-bladders they contain are also of great size, and could be rendered valuable, while the fish themselves, in a cured state, are, to say the least, quite equal to the imported article. They school in midsummer, which is also their spawning season. They do not migrate, but pass in and out of the rivers with the tides.

King-fish *(Seriola Lalandi).*

This fish is possessed of beautiful symmetry, combined with immense speed and power. In its habits it closely resembles the jew-fish, frequenting the sea (which is its natural habitat), as well as the harbours and rivers, at certain seasons of the year. It is likewise carnivorous, very voracious, and a great devourer of young fish. Differing from its prototype, it is gregarious and schools in vast numbers during a portion of the summer months, and although essentially a deep-sea fish at that period, is often beheld in great masses migrating along the surface of the sea. At such times it will not take bait, but, strange to say, at other times, when located in its natural element, the depths below, it seizes fish-bait with great voracity. When hooked it is a terror to the fisherman. A full-grown king-fish, of, say, 40 or 50 lb., when struck by the hook, literally speaking, flies through the water, when it would amount almost to madness to check him, until he becomes in a measure exhausted, which is not soon. At rare intervals they are caught in quantity by the seine, but the line is the more effective and generally used implement for their capture. The older and larger fish are similar in coarseness of flesh, to the jew-fish and by many is considered equally unpalatable in its fresh state, but the smaller fish, say, from 4 to 12 lb., are fairly well flavoured. Taken all round, if properly preserved it would prove to be fully equal to the general run of imported cured fish. When smoked it is in its best dress, and is duly appreciated by those who are aware of its qualities, when cured after that fashion. These fish spawn in December, but the location of the grounds whereon they deposit their ova is unknown.

Tailer *(Lemnodon saltator).*

The tailer, for its size, is a most rapacious and destructive fish, destroying in its raids more young fish than it can consume, swallowing one perhaps for every ten or twenty it kills. It is very strong and remarkably swift, possess-

ing sharp piercing teeth. A school of them when enclosed by a seine often make sad havoc with its bunt, in a very short space of time tearing the meshes to pieces. Capturing a school of tailer frequently means great expense to the fisherman in the shape of a new bunt for his net. It is a shapely fish, having very small scales, reaching occasionly up to 10 or 12 lb., and about 30 inches in length, but the average weight of the adult fish is from 2 to 4 lb. It spawns in April, and passes along the coast during that month, and the early part of May, in moderate schools, entering the harbours and rivers *en route*, in which localities it makes its presence known to the young fish of all species in a most unmistakable manner. The tailer requires to be utilised soon after it is caught, it is then highly nutritious and well flavoured. Properly cured and smoked it is not to be excelled by any other fish living in Australian waters.

Samson-fish *(Seriola hippos).*

This fish is very erratic in its habits, sometimes putting in an appearance on the deep-sea grounds off the coast in moderate quantities, at other seasons it is very scarce, a solitary fish being caught only here and there It is a congener of the king-fish, and is even a more powerful fish than the latter, as its name denotes. It does not attain so great a size, its extreme weight being about 10 lb., and length nearly two feet. It is a dry and somewhat coarse fish, but well adapted for the curing process. It possesses amazing strength, considering its comparative smallness, and that is the best that can be said of it.

John Dory *(Zeus Australis).*

A valuable and fine flavoured fish, identical in every respect with its namesake of Europe (*Zeus faber*). The John Dory is one of the very best of our food fishes, but unfortunately its visits to our seaboard are few and far between. That the fish exists in quantities at some point not far distant from our coast-line, there can be but little doubt. When this fish does put in an appearance it is generally in the autumnal months, but its stay is always of short duration, and in some seasons it is found somewhat more plentifully than at others. It is carnivorous, and when dropped upon takes a yellow-tail or mackerel with avidity. Its flesh is beautifully flavoured, firm, and white, in fact its excellence is proverbial.

Trevally *(Caranx Georgianus).*

The trevally is with us in moderate quantities during the greater part of the year. It is gregarious and is a winter spawning fish, schooling in the month of May, it migrates close in shore along the coast in a northerly direction in large bodies. When in season it is fairly nutritious and well flavoured, but generally in the summer months it has a lean appearance and becomes somewhat coarse and flabby. For this reason the fish is held in indifferent repute, which it does not wholly deserve. When first caught it has a beautiful appearance ; in colour its back has a lovely azure or light purple tint or both combined, the lower parts gradually merging into a silvery white, the whole variegated with candescent streaks and golden stripes, all of which disappear after death. The school fish never reaches over 2 lb., in weight, and it averages 10 inches in length; but the deep-sea variety are much better flavoured, and are often taken weighing up to 7 lb. The former are only partially carnivorous, but the latter take fish-bait ravenously and are not gregarious.

Black Bream *(Chrysophrys Australis).*

Why this fine useful fish should be denominated "black" is hard to determine, unless it be to distinguish it from the red bream or young schnapper. Black it certainly is not, nor does it in any way approach to that sombre hue. Its colour is a silvery grey two or three shades deep, spread over the body, while the head assumes a bluish tint which becomes more dense towards its termination. But colour has nothing to do with the excellence of the fish, the black bream, so called, is one of the best and most abundant of Australian fish. It is disseminated through all the coastal waters of the Colony and even penetrates into the brackish waters of the upper rivers. It is omnivorous, feeding at times upon small mollusca and river moss, but its chief delight is shrimps and prawns. It abounds in all the salt water rivers, in some of which it attains great dimensions, and is caught in quantities at all seasons of the year, both by line and net. It is, however, most abundant in the summer months, when it becomes gregarious and migrates in a northerly direction, keeping close to the coast. At the latter end of January it commences to "school," which continues in all February, at which period the fish are in fine condition and full of roe. The schools are not large but they are continuous, and succeed each other at comparatively short distances, seemingly as if the fish travelled in families. When they get away down north, very often in the season a union of two or three or more "blocks," as the fishermen term them, is effected, and very large hauls are made on the sea beaches, and on the sand flats of the harbours. At times in the summer months they take bait with avidity, but during winter it is difficult to get them to accept bait unless tempted with live prawns; however, they are captured with the seine more or less all the year round. Bream are good keeping fish, and when in good condition are considered only second in flavour to the schnapper. The weight of the full-grown fish is from 2 to 3 lb., but the river fish are often caught up to 5 lb. The latter are wary customers and are seldom tempted with bait of any description.

Tarwhine *(Chrysophrys hasta).*

The tarwhine is a near congener of the black bream. In shape and size it is very similar to that fish, but with the following distinctions: its colour is brighter and more silvery, its scales are smaller, and its head has a more circular form, being somewhat similar to that of a young schnapper. There is very little difference in the habits of the two species, except that the tarwhine is more at home in sandy bottoms than the bream. They sometimes mix up together in schooling, which occurs at the same period, but more often the former species migrate by themselves and assume much larger proportions. The tarwhine is not quite so ubiquitous as its congener, and is seldom seen in the upper rivers, nor is it nearly so numerous in the winter as it is in the summer months. Both these species of fish are reputed to spawn twice during the year, but the fact is doubtful, and certainly not well established.

Blackfish *(Girella tricuspidata).*

Like the bream and tarwhine, the blackfish is profusely distributed all along the coast. Its chief resort is amongst the rank weed growths in the shallows of the rivers and lagoons. It is not a migratory fish, and is very seldom seen or caught in the ocean. It is peculiarly a river fish, possesses great fecundity, and spawns bi-annually. Its spawning periods are in June and December. These fish abound in all the harbours, rivers, and lagoons, but in consequence of their great abundance are held in only moderate repute,

nevertheless they are by no means ill-flavoured. At certain seasons they are very fat and at all times the flesh is white and firm. By those who possess a knowledge of its good qualities, it is accepted as a valuable and toothsome article of food. At full growth it averages about 3 lb., but in the warmer climates of the northern rivers and lagoons it is repeatedly caught weighing 5 lb. and upwards. The length of the adult fish is from 10 to 15 inches. It is herbivorous, and very shy, seldom taking bait. In many localities it can be taken in quantities with the seine. Its colour is a very dark brown, sometimes approaching to black, with faint zebra stripes. It has a small head, with thick fleshy body, and is easily cured. It is not migratory.

Perch *(Lates colonorum)*.

This fish prevails in both fresh and salt water rivers, and at intervals is caught in the sea at short distances off the coast, where it attains its greatest size. It is neither gregarious nor migratory, and is rarely caught in large numbers at one haul of a seine, but subsequent to freshets it makes its way down from the upper waters of the rivers to the harbours, at which periods it is captured in greater quantities. The perch is not strictly speaking carnivorous when located in its natural home, the upper rivers, but whenever it migrates into brackish or salt water, it will take fish or prawn bait greedily. It seems to flourish in the sea, where it is caught at intervals weighing up to 5 or 6 lb., and then it may be classed as one of the best of our food fishes, being far superior to its fresh water kindred, which never exceed 3 lb. in weight, or 12 inches in length. This species of perch deposits its spawn in the lagoons and upper rivers during the month of November.

Whiting *(Sillago maculata)*.

The whiting of this Colony bears no affinity whatever to the European fish of the same name. It is far superior to the latter, and is most assuredly one of the finest and most useful species of fish to be found in Australian waters. The species of whiting under notice is peculiar to the New South Wales and Queensland coasts, but is most abundant in the waters of the former. It is with us in moderate quantities all the year through, but the summer season is the time of its greatest abundance, and then it is in its best condition, revelling in vast numbers on the fringes of the ocean beaches, and on the huge sand-banks within the bar harbours of the various ports all along the coast. It is gregarious, and only partially migratory. That is to say, during the winter months, it departs from the shallow, sandy flats of the harbours and rivers, and seeks for warmer localities in the depths of the neighbouring ocean, returning in the latter spring months augmented in numbers, in splendid condition, and laden with ova. In good seasons the fish are exceedingly abundant, particularly so on the huge sandy bottoms so prevalent along the northern coast, where it is no unusual occurrence for from 50 to 70 bushels of fine matured whiting to be taken at one haul of the seine. The fish swim close to the bottom, often ploughing up the sand as it moves along, and often when a body of them are enclosed with a net, many will be lost to the fishermen by their burrowing in the sand, the lead lines of the seine passing over them. The whiting is symmetrically formed, densely scaled and well fleshed; when full grown it measures over 12 inches and weighs about one and a quarter pound, but the usual average run of the school fish is from 10 to 16 ounces. Every particle of its flesh is snow white, firm, and flaky, while in flavour it is simply delicious; and when lightly cured and smoked it forms a breakfast delicacy not to be surpassed. To sum up in a few words, this species of whiting is one of the most valuable and useful fish existent in Australian waters.

We are possessed of two other species of whiting, viz., the trumpeter whiting (*Sillago bassensis*) and *S. ciliata*. The former may be classified as a deep-water fish, not so abundant as the *S. maculata*, nor attaining to the dimensions of that fish, nor possessing the same delicacy of flavour. Still it is an excellent fish. It never exceeds eight ounces in weight. Its chief habitat is on the sandy bottoms of bays and other estuaries in from four to six fathoms of water. It is not gregarious; whether it migrates or otherwise is uncertain. The *S. Ciliata* bears a close affinity to the former, but from its scarcity claims no further description.

Garfish or ballahoo *(Hemirhamphus intermedius)*.

This very delicious fish is common to all Eastern and Southern Australia. It migrates along the whole extent of the coast of New South Wales, passing north in very great schools, from the latter part of March to the end of April, sometimes continuing to May in each year. During its period of migration the schools keep close to the shore, and large detachments of them are often driven into the harbours and other indents of the coast by the numerous birds and fish of prey which invariably follow in the wake of the travelling masses. At such times they are easily captured in quantities by small-meshed seines, and form a rich harvest for the fishermen. This species of garfish is essentially a denizen of the sea, and seldom enters the harbours in bulk, unless driven in by exceptionally heavy weather, or by the action of its many marine persecutors. If our fishermen were provided with drift-nets and sea-going craft these fish might be captured in enormous numbers, but under existing conditions they have to content themselves with such as come to them, having no means by which they could reach the great bulk of the fish. The adult sea-garfish, when full grown, is from 10 to 14 inches in length, and in weight about three ounces. Its scales are deciduous, which gives the fish, after it is captured, the appearance of being naturally scaleless, which it is not. Its food is a fine description of marine moss, and it always swims on the surface of the sea. It spawns in April, but where it deposits its ova is a problem yet unsolved.

River Garfish *(Hemirhamphus regularis)*.

This species of garfish is only to be distinguished from its congener by its somewhat smaller size, its speckled back, and the greater adhesiveness of its scales. In all other respects its general formation is a *fac simile* of the sea species. It is known as "the river garfish," and strange to say it is gregarious but not migratory, its permanent habitat being in the harbours and rivers. Not a great many years ago this beautiful fish swarmed in prodigious numbers in all the rivers which debouch into the sea within 20 miles of the metropolis, but sad to say, in consequence of indiscriminate and incessant netting, those once prolific waters have been rendered almost barren, and as far as those localities are concerned, the river garfish has become a thing of the past. Nevertheless they are still to be found in quantities in the more distant coastal rivers and lagoons, in the placid waters of some of which a seine has never yet been shot. The river garfish possesses an exquisite flavour, superior even to that of its sea congener; but in size it is less than the latter, seldom exceeding 10 inches in length, or more than two ounces in weight. It spawns during the latter part of April, and the earlier part of May, and deposits its ova in the dense, weedy portions of the rivers and lagoons.

Long Tom *(Belone ferox)*.

This fish is identical with the true green-bone garfish of Europe. It is gregarious and migratory, and usually puts in an appearance off the coast in moderate detachments following the great schools of mackerel which travel along the seaboard annually, in the months of December and January. It is generally not very plentiful in the harbours and rivers, but is to be found in those localities in small quantities during the greater part of the year. Nevertheless great hauls of these fish have occasionally been made in the distant lower northern rivers, where they attain a great size, viz., from 4 to 5 lb. Many people imagine that, because of their green bones, they are poisonous as food, but this is nothing more than mere fancy. The fish properly cooked are toothsome enough, and the larger the size, the better is the flavour. They are carnivorous, but will not take bait. The long Tom is possessed of a formidable beak or snout, which, in the full-grown fish, is at least 4 inches in length, and is armed with disconnected, wicked-looking teeth, with which it makes sad havoc among the smaller species of fish, seizing them with unerring aim in its swift undulating attack. When and where they spawn is unknown.

Flathead *(Platycephalus fuscus)*.

The flathead is common to all Australia, Tasmania included, and is found in large numbers, frequenting at all seasons of the year the harbours, rivers, and estuaries situated along the coast. There are several species of this fish, but the difference existing between them is infinitesimal, and in some instances can scarcely be detected. In shape and general conformation all are identical. It is in variety of colour and size that they differ. Three species only require to be particularised here, and those are:—1. The dark brown or sand flathead; 2. The river or black flathead, and 3. The light drab or sea flathead. All these possess the same instincts and are exactly similar in their habits, being carnivorous and greedy devourers of any description of bait offered to them. In many localities both north and south of Sydney Heads they are to be found in great numbers, and the drab-coloured species abound on many of the sandy bottoms of the sea a mile or two distant from the coast. All the species are exceedingly well flavoured, but preference is to be given to the sea fish. The flesh of all is perfectly white and very flaky. They are bottom fish and often bury themselves in the sand, leaving only their eyes exposed in order to detect the approach of their prey. The average weight of the adult fish is from 2 to 4 lb., but the dark-brown or black species are often caught when fully matured up to 15 lb. and nearly 3 feet in length. They are flat fish but become cylindrical toward the tail. Like the majority of Australian fish they migrate in the spawning season. In the summer months they are in fine condition and full of roe. It is asserted by some experts that they breed bi-annually, but such is doubtful.

Sea-mullet *(Mugil grandis)*.

Of all the fishes contained in New South Wales waters the sea-mullet is undoubtedly the most valuable, not only on account of its superabundance, but for its intrinsic commercial importance. This splendid fish is located in all our coastal rivers, estuaries, and lagoons in greater or less quantities throughout the year, but from the latter end of March, extending sometimes to the middle of May, it makes its appearance off the coast in enormous schools, migrating from south to north. These great bodies of mullet

travel generally at a distance of about 2 miles from the shore, and are literally packed in dense masses, each one covering many acres of sea. Very often, in course of migration, two or more schools will unite. At such times a wonderful spectacle meets the eye. The sea, nearly as far as the eye can penetrate, appears a seething mass of active life. The "work" of the fish is unmistakable, and when unmolested they are to be seen leaping out of the water in every direction. At other times, when attacked by any of their numerous marine enemies, the immense body of fish takes fright and rushes along the surface of the sea at a terrific pace, causing the surrounding waters to assume the appearance of moving sheets of foam. Nature has endowed these fish with an extraordinarily wonderful instinct. As each separate school moves along the coast, a detachment of fish leaves the main body on arriving opposite to every harbour or indent on the coast from which a river extends, and enters it for the purpose of depositing its ova. These are the comparatively small runs of fish which the local fishermen misname "schools of mullet" and succeed in capturing periodically in the harbours and rivers. The schools proper very seldom approach within a mile from the coast, unless driven in *nolens volens* by a succession of exceptionally heavy easterly weather which, however, rarely occurs at that season of the year. The sea-mullet is endowed with a splendid conformation of body, but at the spawning period it is exceedingly obese, fleshy, inordinately fat, and carries immense roes. The full-grown fish averages from 4 lb. to 5 lb. In length it varies from 15 to 20 inches and often more. In many instances it reaches up to 8 lb. in weight. It never takes bait. During its migratory period, it lives entirely upon suction, or, what is very probable, is nourished by the immense proportion of fat which is disseminated throughout its body at this particular season. Its roes, which are of a bright yellow colour, are of great size and of delicious flavour, either in their fresh state or cured and smoked. In this latter state they are much appreciated, but under present conditions the supply is never equal to the demand. Each full-grown mullet will yield, if properly treated, nearly a pint of fine clear oil, which could easily be rendered very valuable for medicinal and other purposes. The fish, subsequent to spawning in the upper parts of the rivers, become lean, flatulent and elongated for a brief period, but soon regain their handsome appearance and original form; but never while it is domiciled in the rivers does it regain the fatness which during migration is its chief characteristic. It deposits its ova in the shallows of the upper rivers and their tributary creeks, as well as in the lagoons, which latter are its favourite localities, when the entrances to them are available. The young fish are hatched in August, and from that time forward are to be seen in vast swarms during several stages of their existence. The fecundity of the sea-mullet is astonishing. It is computed that the roes of a female fish contain two and a-half million eggs, and were it not for the pertinaceous rapacity of the numerous enemies of the young fry, the sea would be overcrowded with the species. The quality of the fish is excellent, and by numbers of people it is estimated to be very little inferior to Scotch salmon, either in flavour or fibre.

Hard-gut Mullet *(Mugil dobula)*.

Why naturalists have bestowed a separate name on this fish is inconceivable, for, beyond a doubt, it is nothing more or less than the sea-mullet (*Mugil grandis*) in its two-year old stage of existence. By some it is styled the river-mullet, and the latter is certainly the more appropriate name for it; because when these fish are captured in small schools in the harbours they are journeying instinctively from the rivers in which they were bred towards

the sea, in order to assume their functions as adults. As regards the term "hard gut," no reason can be assigned for such an appellation, and it is most assuredly a misnomer. The so-called *mugil dobula* is absolutely the progeny of the sea-mullet, impelled by nature to depart from the rivers on reaching a certain age, to become matured in the open sea, after passing the second year of its existence in the upper rivers. It migrates in small schools in the month of January, at which period it is about two-thirds grown, and if not intercepted reaches the ocean in due course.

Talleygalann, or Sand-mullet (*Myxus elongatus*).

This fish, though not nearly so abundant as its congener (the sea-mullet), is not by any means to be despised. It does not attain the dimensions of the latter, nevertheless it is useful and well flavoured. Its chief resort is enclosed waters; but in the winter months it makes for the sea, and migrates in small schools from river to river, always keeping close inshore. Full grown, its weight seldom exceeds 1½lb., or its length 12 inches. It deposits its ova in May, after which for a brief period it becomes lean, flabby, and unpalatable; but, like the sea-mullet, it soon regains its proper form. This species of mullet was at one time very abundant in the home fisheries, but, from causes already explained, it has almost disappeared from those localities; still, the fish are fairly abundant in the more distant coastal rivers.

Flat-tail Mullet *(Mugil peronii)*.

The flat-tail mullet differs only from its near congener (the talleygalann) in the colour of its eyes, and the greater breadth of its caudal extremity, whence its appellation. In habit, size, and instinct, there is no distinction. With the exceptions stated, the same description is applicable to both species, but the former is the more numerous. In the schooling season they often amalgamate, more especially during the period of migration.

Maray, or Australian Pilchard *(Clupea sagax)*.

Strange to say, the "maray" or pilchard, although one of the most abundant of all species of fishes contained in Australian waters, is the least known to the great majority of the inhabitants of this Colony, and it may be safely added, is never seen in the fish-markets or shops in Sydney, nor is it in any form exposed for sale. It appears off the coast in the month of July, often continuing till the middle of August, migrating in multitudinous schools, passing from south to north, at a distance varying from 2 to 4 miles from the shore. It is no exaggeration to affirm that during the periods of migration it is to be seen covering a great expanse of the surface of the sea. Whether such tremendous bodies of fish comprise only one or several united schools it would be difficult to determine; nevertheless the fact of its presence in our seas in such huge quantities and at such times is beyond dispute. Although known to migrate annually along the whole extent of the New South Wales coast, the maray has never been observed frequenting the more shallow inshore waters, or any of the harbours or rivers, the fish keeping, on all occasions, well to sea. There is only one instance on record of its having visited enclosed waters in any quantity. The incident referred to occurred in the month of August, 1866, when the writer was residing in Melbourne, and was an eye-witness of the phenomenon. At the period named Hobson's Bay, from some cause unknown, was invaded by enormous schools of "maray" or pilchard. The vast expanse of waters comprising this extensive bay was, literally speaking, alive with the fishes.

They predominated in every direction, and were captured in prodigious quantities. Hundreds of tons of them were taken with all descriptions of implements. Seines, hand-nets, baskets, and even buckets were brought into requisition by hundreds of professional and non-professional fishermen. The fish were conveyed through the city and suburbs of Melbourne in cartloads and sold for 6d. a bucketful, while scores upon scores of tons were distributed through the country towns. Notwithstanding the prodigious quantities of these fish passing along our coast for at least six weeks annually, they are most completely iguored. No attempt has hitherto been made to capture and utilise any portion of them, but they are suffered to come and go with impunity. The cause of such deplorable laxity is the utter absence of sea-going fishermen and fishing appliances. The fully-matured fish are from six to seven inches in length. Their flesh is rich, oily, and of good flavour, but if exposed for any length of time to the influence of the weather will quickly decompose. The "maray" is easily cured, and with due attention to the process could be rendered an excellent substitute for the Yarmouth bloater.

Herring *(Clupea sundaica)*.

This is another species of the *Clupea* family, and is more widely known than the *C. sagax* because, unlike the latter, it is to be found in larger or smaller quantities, at all seasons of the year, in most of the coastal rivers. It migrates about a month earlier than its congener, that is, in June, continuing sometimes to July, travelling at about the same distance from the shore in very large schools, but not in such huge bodies as the "maray." Nevertheless, the schools are of large dimensions, and always take a northerly direction. This species of herring is easily distinguishable from the former. In colour it is silvery white, its scales are deciduous, and it is possessed of yellow bands on either side of its back and has a much deeper and more compressed body than the "maray." It is about seven inches in length, its flesh is purely white, and possesses a very delicate flavour, and like its congener, the European herring, it carries in the season of its migration very large roes. These fish are often caught in the coastal rivers in moderate quantities, but are very seldom brought to market or utilised in any shape, because our so-called fishermen will not trouble themselves to collect them when drawn by the nets on to the shores, as they are considered too insignificant to merit the attention of their captors.

Mackerel *(Scomber Australasicus)*.

The Australian mackerel differs but very slightly, if it differs at all, from its European or American namesake. In size, colour, instincts, and general conformation of body, no appreciable difference can be detected. These fish commence to migrate along our coast about midsummer, and continue to do so for about six weeks. The schools assume immense proportions, each one covering a vast expanse of the sea's surface. The same may be said of them as of the pilchard and the herring, viz., none of the fully-matured mackerel are ever seen exposed for sale in the Sydney fish-market or fish-monger's shops. During the summer season schools of young or half-grown fish of this species continue to visit the lower parts of Sydney Harbour and other localities extending along the coast. These are mostly utilised for bait, for which purpose they are highly and deservedly appreciated. The full-grown fish rarely entering enclosed waters, only a straggler or two may be caught at long intervals, but the huge schools of mackerel which pass along the coast annually continue to go their ways unheeded and in peace, so far as the fishermen are concerned, for the mere want of enter-

prise and suitable sea-fishing appliances. During the migration of these vast bodies of fish, they are subjected to continual depredations of sharks, porpoises, bonita, and other fish of prey, as well as of carnivorous aquatic birds of various species, all of which at times make sad havoc in their ranks. A prejudice exists against utilising the mackerel for human food, but the fish is good and palatable enough if eaten shortly after it is caught. It dies almost immediately after its removal from the water, and no great length of time ensues before decomposition sets in. According to naturalists we have another species of the genus *scomber* located in our waters (*scomber antarcticus*), but the difference between the two is scarcely appreciable and difficult to be detected.

Flounder *(Renderhombus Urssellii).*

In some seasons this fish is more plentiful than in others. It affects sandy bottoms in five or six fathoms of water, both outside and inside the harbours, bays, and estuaries of the coast. It is carnivorous, and at times take fish-bait freely, but is only captured in very small quantities with the seine. In the autumn months fair numbers are taken with the line in some favorable localities, and doubtless when the trawl is introduced in our fisheries this species of fish will be caught in greatly augmented numbers. It is with reason supposed to be gregarious, and it is of a certainty migratory. Beyond a doubt, at a certain period of the year, it comes into the shallows from its natural habitat in the sea, the precise locality of which is at present undiscovered; but which some day—it is to be hoped in the near future—the lead-line and the trawl in their much needed operations will place beyond mere conjecture. The flounder is much appreciated as a delicate, exquisitely-flavoured fish, but unfortunately the supply is nothing like equal to the demand. Its extreme weight is about $1\frac{1}{2}$ lb., but the average of the fish is from $\frac{1}{2}$ lb. to 1 lb. It is a winter spawning fish and deposits its ova in May or June.

Sole *(Synaptura nigra).*

There are but few instances on record of this fish having been captured in close proximity to the sea. It is generally found burrowing in the sandy bottoms of the rivers and shallow bays. It is herbivorous, and never known to be caught with the line, and very difficult to capture with seines, as it lies so close to the bottom, and in very many instances is covered in the sand. Spearing is the method most approved for taking it; but it is by no means abundant, so far, at least, as we have at present discovered, in its favourite localities. It is perhaps more numerous at the spawning period, when it becomes slightly gregarious, and more on the move than is its wont. It deposits its ova in the upper rivers in the latter part of February or the commencement of March, at which period it is in good condition and delicately flavoured; though an ill-deserved prejudice exists against it on account of the abnormal thickness of its skin, which in all cases should be removed before it is cooked. In length the adult fish measures about 10 inches and in width nearly 7 inches, and when full grown weighs from 15 to 18 ounces. There are two or three other species of sole existent in our waters, one of which is the true English species, but it is rarely seen, and but very seldom caught

Hair-tail or Ribbon-fish *(Trichiserus haumela).*

This fish, with perhaps one exception, is the only representative of the numerous family of ribbon-fish that we possess. It is scaleless, and endowed

with a singular caudal extremity terminating in a very fine point, whence its name. Its body is greatly compressed, and its head somewhat elongated with great staring eyes and formidable looking teeth. When first caught its very thin skin has a bright silvery appearance, which becomes a few shades darker after death. When full grown it measures nearly 3 feet, and weighs about 2 lb. Its flesh is white, but nothing to boast of; yet many people evince a partiality for its peculiar flavour. It is rather erratic in its habits, and appears off the coast in the midwinter months; but sometimes three or four years will intervene between its visits. It is gregarious, fairly numerous, and deposits its ova in July.

Eels *(Anguilla Australis).*

Eels abound in all the fresh-water rivers flowing eastward, and also in the brackish upper waters of the coastal rivers. In both localities in many instances they attain great size, weighing up to 15 lb., but their general average is from 2 lb. to 5 lb. It is a singular fact, that notwithstanding their abundance, very few reach the Sydney market, where the price asked for them is always exorbitant. This should not be the rule, but the exception. Under ordinary conditions they should be plentiful and cheap. Strange to say, eel-fishing, though very simple in its practice, is almost entirely beyond the ken of the local fishermen. We have also another very fine species of eel *(murainesox bagio)*. It is peculiarly a salt-water fish of delicious flavour; but not by any means so abundant as its fresh-water congener, neither does it attain so great a size; its average weight at maturity never exceeds 4 lb. It is known as the silver eel, so called from the silvery hue of its under parts.

Cray-fish *(Palinurus hugelii).*

This splendid species of crustacean is said to be peculiar to the east coast of Australia, where it exists in countless millions. Its habitat extends along the New South Wales coast from Cape St. George in the south to the Solitary Islands in the north, or even beyond, a distance of nearly 300 miles. Here the cray-fish abound in various localities and attain a great size, varying up to 7 lb. In their season they are full of flesh, which is snow-white and of excellent quality; its flavour being quite equal, if not superior, to the far-famed American lobster, the procuring of which affords employment for many hundreds of people, while here in this Colony certainly not more than twenty or thirty men are engaged in the working of these extensive and highly prolific fisheries, and that only partially. The implements used by the latter for the capture of cray-fish are of the most primitive description, viz., small circular hand-nets depending from hoops, in the bottoms of which is placed the bait. These are sunk from a boat and suffered to remain at the bottom of the sea for about a quarter of an hour, when they are hauled up and their contents secured. If the fishermen are fortunate enough to capture a few dozen for their night's work they are quite satisfied with the result, and forward them on to market by the first available opportunity. Such are the miserable and primitive conditions under which these great and incomparable crustacean fisheries are sought to be utilised. We import annually large quantities of American canned lobsters; but not a single cray-fish taken from our own waters has ever undergone the process of canning. Here is what might be under ordinary conditions a huge industry lying almost dormant, solely for want of a moderate amount of energy and enterprise. The fecundity of this species of crustacean is marvellous. It is computed that the great bunches of spawn carried by the female beneath the

whole length of her tail or "flapper" contains no less than 400,000 eggs. It sheds its ova in April in the vicinity of submarine rocks and reefs. In the months of July, August, September, and October its condition is splendid, and at these times its location is near the shallow foreshores of the coast where it assembles in vast numbers. In the summer months it seeks the deeper waters, from whence our fishermen—having no suitable appliances—never attempt to remove it. Probably, in the near future, when the value of our immense cray-fish grounds become duly appreciated and better understood, they will be profitably developed.

In giving the foregoing abbreviated descriptions of the principal food-fishes of New South Wales, it must be understood that the writer has only selected those species which possess an intrinsic commercial value. Our waters contain numberless other species of edible and non-edible fishes, to enumerate and furnish a descriptive account of which would require infinitely more time and space than the occasion would warrant. Suffice it to say, that the main object of this treatise is to clearly demonstrate the fact, not yet universally known, that Providence has, with no niggardly hand, lavished its piscatorial favours on the teeming waters of Australia, those of New South Wales more particularly.

This Colony presents the extraordinary anomaly of having its fisheries stocked to repletion, while poverty of production, and abnormally high prices, rule supreme. This deplorable state of things, as previously commented upon, is to be attributed principally to two causes, viz., want of enterprise and lack of experienced sea-going fishermen. Under favourable conditions, instead of importing great quantities of fish from other countries, we should be large exporters, in addition to supplying our own local market to its fullest requirements Taking only six species of the most abundant of the fishes described in this essay, viz., schnapper, mullet, salmon, herring, mackerel, and whiting, there is, without question, ample room, both on and off the whole length of the coast of New South Wales, for the continual and profitable employment of hundreds of practical fishermen, who, if endowed with energy and enterprise combined with adequate equipments, would doubtless succeed beyond their greatest expectations.

The six species of fish alluded to, if systematically manipulated, would in themselves be sufficient to form a vast industry, and, if we take them together with the several other species herein described, no tangible reason exists for the continuation of what may be denominated as a fish famine. If the men and the means were forthcoming, our fisheries would prove to be second to none, either in the Southern or Northern Hemisphere; but, under present untoward conditions, they are left to languish in their abundance and wealth. For instance, let us take that splendid fish, the schnapper, as one example of the lax manner in which our fisheries are worked. This fish, as before stated, abounds in every direction at a moderate distance off the coast; but the "wide off" grounds, for obvious reasons, are very seldom touched by the fishermen, whose attentions are generally confined to the inshore grounds near Sydney Heads, and a few miles only north and south of them, which localities by this time are fairly "fished out," yielding only a few straggling fish at long intervals during the earlier summer months, when the fish move in towards the coast to deposit their ova. Schnapper, instead of being cheap and abundant, which it should be, is always costly and scarce. We have not to go far to seek for the cause of such exorbitance and scarceness. The fish revel in 40 or 50 fathoms of water in the "wide off" grounds, distant from 10 to 20 miles seaward off the coast, according to the seasons. The fishermen, with their

small, and in many instances rickety, open boats (which are totally unfitted for sea work) cannot reach the great bulk of the fish, so they remain content to potter about the now almost denuded inshore grounds, in the contiguous localities previously alluded to, where, if two or three men are fortunate enough to capture a dozen or so for their day's work, considering the abnormally high prices they will obtain for them, they are contented. At intervals, and in fine weather, amateur fishing parties, in small steamers, visit some of these "wide off" grounds. In many instances they are successful, returning, after a few hours' fishing, with from 500 to 1,000 fine fish. In the face of this, it would appear scarcely credible—nevertheless, the fact remains to our discredit as a community—we have not a single steamer employed on these grandly prolific schnapper fisheries. From these causes scarcity rules where abundance should prevail, and we are left to deplore the unexampled inadequacy of our fish supply.

The sea-mullet is another very important factor in our fisheries. As stated elsewhere in this essay, it visits the New South Wales coast annually in stupendous numbers, but, for reasons already explained, the great bulk of these immense bodies of fish are suffered to pass by our very doors, as it were, untouched, and without any attempt at interception on the part of the fishermen. During the period of its migration, it is essentially a sea-fish; hence its immunity from capture by the fishermen, whose operations are unfortunately restricted to the rivers and lagoons, and the foreshores of a limited portion of the coast, or other similar localities where the seine can be made to perform its function. In such localities, and by such means, comparatively small detachments of the fish are secured at intervals in the season by the fishermen, but the great bulk of the "schools" continue on their way unmolested and unheeded.

It is highly probable that the great majority of local fishermen never come in contact with a school proper of sea-mullet. What the former designate a school of mullet is nothing more than one of the small detachments of fish which, impelled by a wonderful instinct, leaves the main body for the purpose of ascending the rivers to deposit its ova. A school of sea-mullet in course of migration is of vast extent, and comprises many hundreds of tons, but our fishermen are mostly ignorant of the fact, consequently they perforce accept these comparatively diminutive sections as representing the whole of the migrating "school." When the many valuable qualities of the fish are considered, it is positively astonishing that hitherto no efforts whatever have been made to intercept and capture even a portion of these immense migrating bodies during their periodical and transient passage over the sea bordering on our coast.

It may be truly said that we heedlessly ignore the wealth with which we have been endowed by a beneficent providence. Here we have huge masses of splendid and valuable fish possessing all qualities that are desirable, yet we refuse to receive nature's munificent gifts. Our hands are wantonly withheld from grasping the wealth which is so liberally offered for our acceptance. It is an absolute fact that we prefer to import from foreign parts that which we have in great abundance at the very threshhold, as it were, of our home.

Under ordinary circumstances it might be deemed superfluous to reiterate what has already been written in another place in this essay, concerning our different species of herring, pilchard, and mackerel, which, although abounding in the adjacent sea at certain seasons of the year, none of them ever find their way, when matured, to the Sydney fish market. Unlike the sea-mullet, no portion of them ever approaches the shallows or indents of the coast.

The various "schools" may at times unite, but they never dismember. Keeping well to sea during the periods of their migration, they are of course beyond the influence of the seine—the only net of any consequence used by the fishermen of this Colony—hence their immunity from capture. It is scarcely conceivable that these stupendous bodies of fish should be so effectually ignored. The herring and mackerel fisheries of the old world are prized beyond measure, while their yields are both lucrative and enormous and give employment to thousands of people. In this Colony the same description of fish exist in the waters in untold myriads, but not a single human being is employed in the industry. Notwithstanding that the neighbouring seas absolutely teem with all the species of fish under notice, we continue to import annually thousands of packages of herring and mackerel in various states of preservation.

That most useful and delicious fish, the whiting, is very abundant in most of the coastal waters of New South Wales. It could be captured in the spring and summer months in the shallows, which fringe nearly all the great sandy beaches of the coast, and if efficient means of transit were forthcoming could be brought to market from distances in enormous quantities; but under present conditions, the same old grounds contiguous to Port Jackson are worked day and night, year after year, consequently the fish, instead of being plentiful and cheap, continue scarce and dear. Whiting are, as a rule, good keeping fish, but, as their season of plenty occurs in the hotter months of the year, it is a matter of impossibility, under the present primitive and uncertain methods of transit, to bring them from any moderate distance to market in good condition. Our whiting fisheries alone, if properly manipulated and systematically worked, would prove highly lucrative. Smoked or kippered, they are not to be surpassed by any other fish in the world, and would be esteemed as a delicacy by the most fastidious of *gourmets*. As fresh fish they are eagerly sought for, but, although one of the most abundant of our shallow water fishes, the supply is never in any way equal to the demand.

Lobster-fishing on the coasts of the island of Newfoundland, and off several parts of the mainland of North America, has during late years reached large proportions, and has grown, by leaps and bounds, into a vast industry, giving employment to many hundreds of people. Factories for canning the fish are numerous in many localities, and very great quantities of canned lobster are exported to many parts of the world, our own country included. We, of this Colony, for a series of years past, have imported thousands of packages of the American commodity, and continue to do so, while we possess a coast line teeming with Australian lobster, or cray-fish, quite equal, if not superior, in quality and flavour, to the imported article. Having given a full descriptive account of this fish in another place, it is needless to travel over the same ground again, except to illustrate the urgent necessity for the proper development of our extensive, and what should be, under ordinary conditions, highly profitable crustacean fisheries.

The New South Wales cray-fish for size and delicacy of flesh has no superior either in the American or English lobster. It abounds all along our coast and can be captured in quantities with very little difficulty. At the present time only a few men, certainly not more than thirty, find employment in cray-fishing, but even these few men keep the Sydney market fairly supplied during the season, which commences in the later part of June and concludes at the end of November. After the latter period the crustaceans move out into deeper water from which the fishermen, not possessing adequate

appliances, cannot dislodge them. On all occasions deep-sea fishing constitutes the *bête noire* of the Australian fisherman. He is quite at home in the harbours or the shallows of the coast, which he will continue to work incontinently, when those fail him he gets very few or none at all. He either cannot or will not try his fortune in the blue waters of the deep sea.

The full-grown cray-fish contains more meat than could be extracted from two matured lobsters, while the flesh within its ten great legs or claws is of exquisite flavour, and with the "coral" or immature spawn contained in the abdomen of the animal, are much appreciated by those who are experienced in such matters.

It is to be hoped that the time is not far distant when these immense and highly valuable crustacean fisheries will become systematically developed. There is ample and profitable employment for numbers of experienced men in the direction indicated, and that in the near future one (or more) lobster-canning factories will be seen in full operation on the coast of New South Wales is greatly to be desired.

Taking our imports of fish from the "New South Wales Statistical Register" for five years, 1886-90, as per annexed extract, it will be found that the net value of preserved fish imported into the Colony for the period stated amounted to nearly £600,000, while for the same period, the amount realised by the sale of fish in the Sydney fish-market, under the control of the Municipal Council, only reached in the aggregate about £182,000. These figures go to prove that our imports of fish for the five years named exceeded more than three-fold the home production. In round numbers we imported during those five years the enormous quantity of 25,000,000 lb. of fish, while during the same period we produced from our own local fisheries, the following quantities :—275,198 bushels mixed net fish, 34,410 dozen sea-mullet, 324 doz. mackerel,* 2,881 doz. salmon, with the addition of line fish as follows :—8,224 doz. schnapper, and 1,281 doz. assorted fish, comprising jew-fish, king-fish, teraglin, cod, &c., &c.; 19,559 doz. cray-fish, and 9,119 baskets of prawns. It must be understood that the fish enumerated above were sold daily by public auction during the five years 1886-90, under the direction of an inspector appointed by the City Council, consequently the figures here given may be accepted as authentic and correct. From the same source it is notified that during the period alluded to 12,558 bushels and 10 cart-loads of edible fish of various descriptions were condemned by the Inspector and destroyed as being unfit for human consumption. This lamentable and great waste of fish-food is much to be deplored, the more so because such serious destruction is easily preventable; but large as the quantity may be considered, it does not form a tenth part of the fish actually destroyed at the stations along the coast, where, for the want of efficient and regular methods of transit, quite as much fish is rendered valueless as reaches the market in good condition.

It will be seen *inter alia* that during the five years mentioned 9,119 baskets or bushels of prawns were disposed of in the fish-market, but this quantity, large though it may appear, does not by any means represent the whole amount caught for the period named, as large quantities of this remarkably fine species of crustacean are otherwise disposed of, not only by professional fishermen but by numberless amateur prawn netters. It may be remarked in this place that the splendid prawns of this Colony for quantity, flavour, and size, are not to be equalled or surpassed in any other part of the world.

* Immature, or half-grown.

In order to more fully illustrate the miserable manner in which the fisheries of New South Wales are worked, it is necessary to requote a few of the figures previously furnished. In the first place it is quite apparent that notwithstanding the annual advent of stupendous schools of several species of the herring family on our coast, not even a specimen of any description has ever been seen in the local fish-market. Mackerel visits our waters in very nearly the same abundance, and what do we find? In a period of five years, out of the myriads of these fish we have received, as the whole produce of the fishery, 324 dozen of immature fish caught in the harbour, but not a solitary one from the sea. Salmon, for the same period, are represented by 2,881 doz., while it is no exaggeration to affirm that this species of fish passes along our seaboard annually in thousands of tons. Schnapper, which abound in numberless localities all along the coast, and to use a fisherman's term "are as thick as flies," have furnished the market within the same extended period with 8,124 dozen, which should have been under ordinary conditions as many thousands instead of dozens. 34,410 dozen represent a five years' capture of sea-mullet, being at the rate of 7,000 dozen per annum. If these splendid fish were appreciated at their full value and systematically fished for, tons should take the place of dozens. Line-fish, exclusive of schnapper, are represented for the half decade, comprising jew-fish, king-fish, teraglin, cod, &c., by 1,281 dozen, or something less than 260 dozen per annum. Considering the vast abundance of these various species of deep-water fish in all directions along the coast, the output is ridiculous beyond conception, and only tends to further illustrate the gross incapacity and utter absence of enterprise on the part of the local fishermen. 19,559 dozen cray-fish is, considering all things, a fairly considerable item of production for the five years named, and yet, under more favourable conditions, the number should have been exceeded by many scores of thousands. The only wonder is that so many should have been captured with the present primitive and totally inadequate appliances of our fishermen, and the restricted number of them employed in the crustacean fisheries.

In concluding this treatise it may be said advisedly, and without fear of contradiction, that in no other country of the world are the fisheries so neglected and mismanaged as those of New South Wales. Our waters absolutely teem with numberless species of fine edible fish, but we refuse to utilise them, preferring to patronise foreign countries for more than three-fourths of our fish supply. Such an anomaly is greatly to be deplored, but it is to be hoped that the near future will provide a remedy, though this can only be supplied by the advent of numbers of practically experienced fishermen, well acquainted with all the usages of deep-sea fishing. Men like this, with the addition of improved modern implements and other necessary appliances, would of a certainty render the grandly prolific fisheries of New South Wales second to none in the Southern Hemisphere.

Preserved fish imported into New South Wales during the years 1886-90 inclusive:

	Value.		
	£	s.	d.
1886	102,991	0	0
1887	97,875	0	0
1888	112,818	0	0
1889	130,757	0	0
1890	123,795	0	0
Total for the five years	£568,236	0	0

Quantity in round numbers 25,000,000 lb.

Value of fish sold in the Sydney fish-market, the product of the local fisheries during the same period:

	£	s.	d.
1886	34,256	17	3
1887	31,309	17	0
1888	38,057	16	0
1889	39,964	17	3
1890	38,658	1	9
Total for the five years... ...	£182,247	9	3

Approximate quantities, 1886-90:

Mixed net-fish...	275,189 bushels.
Sea-mullet	34,410 dozen.
Salmon...	2,881 „
*Mackerel	324 „
Schnapper	8,224 „
Other line or sea-fish	1,281 „

Crustaceans:

Cray-fish	19,559 dozen.
Prawns	9,119 baskets or bushels.

Fish received in bad condition and condemned as unfit for human consumption, 1886-90:

12,558 bushels.
10 cart-loads.

Fisheries at Lord Howe Island.

This island is situated about 400 miles north-east from Sydney Heads, and is a dependency of New South Wales. The enormous quantity of fish contained in the seas surrounding it is truly remarkable. The innumerable islands of the South Seas are proverbial for the numberless species and great abundance of their fishes, but Lord Howe Island stands out prominently above them all in its piscatorial development. What it is that attracts the fish in such vast and unprecedented numbers around this solitary island is difficult to imagine; but there is no questioning the fact that fishes of the finest species and in almost inexhaustible supply are at all seasons of the year congregated around and near that locality Trumpeter, schnapper, cod, blue-fish, king-fish, groper, *et hoc genus omne*, are located there in endless profusion, all of them carnivorous and taking fish-bait freely. No difficulty whatever would be experienced in capturing them in vast quantities and moreover the place is eminently adapted for a fish-curing establishment on an extensive scale The island is inhabited by a few Europeans who are employed in raising farm produce, &c., and vessels on their way to and from Norfolk Island make periodical visits. There is good anchorage for vessels of moderate burden inside the reef. If efficient means of transit were available, large quantities of fresh fish of the finest species might be periodically forwarded to both the Sydney and Brisbane markets, from which cities the island is nearly equi-distant. As a fish-curing station it would in all probability prove to be unequalled by any other locality situated in the southern seas.

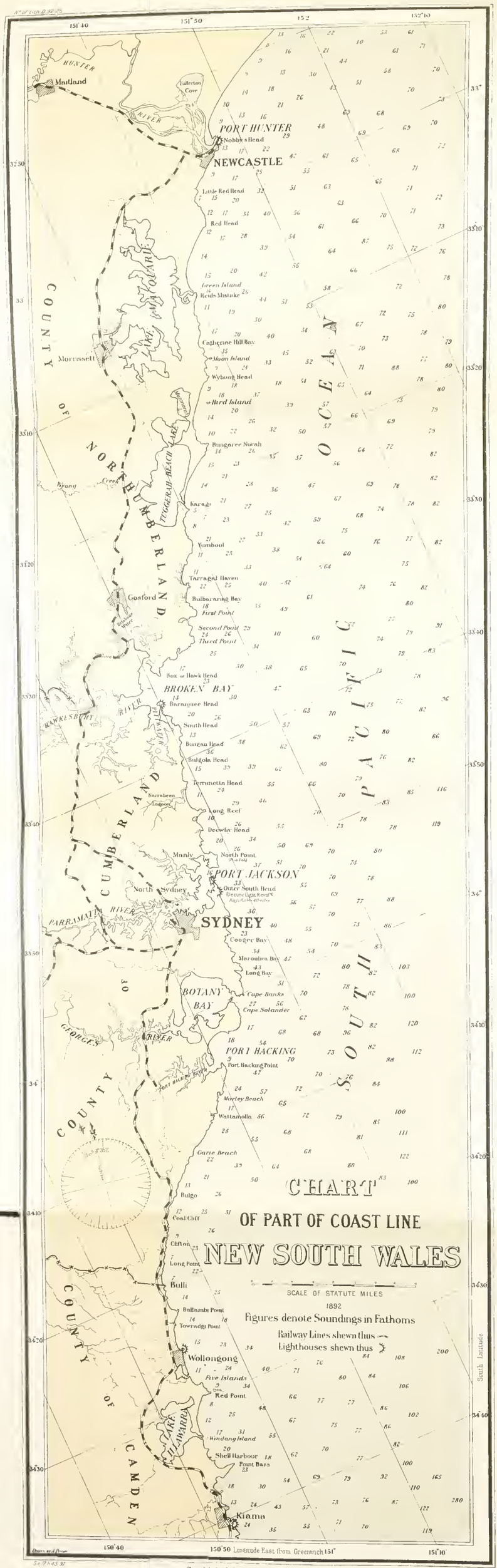
* Unmatured, or only half-grown, not captured at sea, but caught in Sydney harbour.

Elizabeth Reef is only a comparatively short distance from Lord Howe Island. This locality is likewise remarkable for the super-abundance of its fish, which consist mostly of the same species as those described in the neighbouring waters of Lord Howe.

It may be safely asserted that in no other place south of the Equator, are fisheries to be found in any way approaching, in density or magnitude, to those here mentioned, in proportion to the extent of the coast-line under consideration.

[One Map.]

Sydney: Charles Potter, Government Printer.—1892.



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